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LINDERA MELISSAEFOLIA

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(Plate 1151)

THE common Spice Bush (*Lindera Benzoin* (L.) Blume) is a well-known aromatic shrub of eastern and central United States and Canada. Its more southern relative, *Lindera melissaefolia* (Walt.) Blume, on the other hand, is very little known, and, if we may judge by preserved herbarium material, one of the rarest shrubs of the United States.

Although known since 1788, when Walter (Flora Caroliniana, p. 134) first described it under the name *Laurus melissaefolia*, during the past 160 years it has been collected but a few times, and is poorly represented in American herbaria. Subsequent to 1788 *Laurus diospyroides* Michx. (Fl. Bor.-Am. 1: 243. 1803), a photograph of the type of which has been kindly loaned me by the Director of the Gray Herbarium, and *L. Diospyrus* Pursh (Fl. Am. Sept. 1: 276. 1814) were referred by their respective authors (doubtfully in the case of Michaux) to Walter's *Laurus melissaefolia*.

Presumably, Walter's material was collected within a radius of 50 miles of his plantation, located "at the southern edge of the great swamp bordering the Santee River, in the coastal plain . . . within the boundary of present-day Berkeley County", South Carolina (Maxon, Wm. R. Thomas Walter, Botanist. Smiths. Misc. Coll. 95, no. 8: 1, 4. 1936). For his *Laurus diospyroides* Michaux does not indicate any specific localities, but does observe "Promiscue cum *L.[aurus] geniculata* habitans".

Since he states (p. 244) "in aquis stagnantibus Carolinae" for *Laurus geniculata* Walt. (= *Litsea aestivalis* (L.) Fern. RHODORA 47: 140-142. 1945), we may assume that the type of his plant, preserved in the Museum d'Histoire Naturelle de Paris, came from either North or South Carolina.

The early authors (Walter, Michaux, Pursh, Nuttall, and Nees ab Esenbeck) had no trouble in distinguishing *Lindera melissaefolia* from the more common and widespread *L. Benzoin*. Walter's original diagnosis (p. 134), in part, "foliis cordato-lanceolatis venosis, membranaceis, subtus pubescentibus", and that of Michaux (p. 243), in part, "foliis oblongo-ovalibus, subtus subtomentosis", emphasized the shape of the leaves, their prominent venation, and their pubescence on the lower surface. Michaux, and later Pursh, were also impressed by the low stature of the plant, referring to it as "humilis". The obtuse or subcordate base of the blade immediately distinguished it from the cuneate or tapering one found in *L. Benzoin*.

Beginning, however, with the treatment of the genus *Lindera* in A. De Candolle's Prodrômus 15, part 1: 244. 1864, reference was made by Meissner under *L. melissaefolia* to a collection from the state of Missouri. Engelmann's name appears in the list of collectors cited by Meissner. An examination of a fruiting specimen occupying the left-hand side of the sheet in the Engelmann herbarium of the Missouri Botanical Garden shows that it has sparse pubescence on the midrib of the lower surface of the leaf of otherwise typical *Lindera Benzoin*. This is the only specimen in the Engelmann herbarium with foliage; the shape and acute base of the blade show, however, that this collection should have been referred to *Lindera Benzoin* instead of to *L. melissaefolia*. The fact that it had the midrib of the lower surface of the blade pubescent may have misled Meissner to include it under *L. melissaefolia*, along with the other specimens cited from Carolina and Alabama (the Virginia reference has not been substantiated by any collection known to have come from that state). Since that time, many collections having pubescent petioles and the leaf-blade more or less pubescent on the lower surface have been named indiscriminately as *Lindera melissaefolia* or *Benzoin melissaefolium*.

It was not until 1935, when Palmer & Steyermark described *Ben-*

zoin aestivale var. *pubescens* (Ann. Mo. Bot. Gard. **22**: 545. 1935) that the confusion caused by this pubescent *B. aestivale* was made known. On the basis of such pubescent specimens *Benzoin melissaefolium* had been given a wide range extending westward to Illinois and Missouri. The error of inclusion of this species for Missouri was perpetrated by various manuals and local floras. Tracy in his "Catalogue of the Phaenogamous and Vascular Cryptogamous plants of Missouri" in 1886, cites (p. 74) *Lindera melissaefolia* from Missouri, based upon a collection from Greene Co. by Professor Edward M. Shepard. Examination of Professor Shepard's plant reveals it to be *Lindera Benzoin* var. *pubescens* (*Benzoin aestivale* var. *pubescens*). Therefore, no true *L. melissaefolia* had ever been found in Missouri. Actually, the recognition of the pubescent variety of *Benzoin aestivale* left *B. melissaefolium* as a rare and little known species, confined, as far as the records up to 1935 went, to the Coastal Plain and Piedmont regions of the southeastern states.

During the latter half of October, 1948, on a collecting trip in the swampy lowland section of southeastern Missouri (actually an extension of the Mississippi Embayment of the Gulf Coastal Plain), in Ripley County, I chanced upon an area of undulating sand hills and depressions, 4 miles south of Naylor, near the Arkansas state line, and about $\frac{1}{2}$ mile west of the boundary separating Butler and Ripley counties. Most of the sandy knob land and higher ground were under intense cultivation, devoted to the raising of cotton, watermelon, squash, and beans. But between the knobs in the depressions, which, during the spring and early summer, are inundated and swampy, occurred a dense forest dominated by *Quercus palustris* and *Fraxinus tomentosa* (*F. profunda*). In a few spots in the area, some of the knolls, protruding above these depressed flats, are still covered by the original forest, and here occur *Acer saccharum*, *Euonymus americanus*, *Aralia spinosa*, *Corylus americana* f. *missouriensis*, *Asimina triloba*, *Cornus florida*, *Hydrastis canadensis*, *Desmodium rotundifolium*, and many other species not found in the wetter depressions.

While walking around the base of one of these knolls, I suddenly caught sight of a scarlet-fruited plant growing in an adjacent depression. Coming closer, I was immediately intrigued

by the relatively large size and abundance of the fruit and by the low stature of the plant. Although I had seen the common Spice Bush (*Lindera Benzoin*) just a while ago in the same area, this plant was distinctly marked by the thinner foliage with the base of the blade obtuse or rounded, and the lower surface conspicuously veined and without the pale or grayish-white color on the lower surface typical of *L. Benzoin*. The leaves also were in a drooping position instead of erect-ascending or spreading as in *L. Benzoin*. Looking around us, Mrs. Steyermark and I discovered that we were standing actually at the edge of a large colony of these shrubs which were covering the depression. All the shrubs were equally low-growing (from 2-3 feet high, although in another colony observed later, some were taller), and formed a dense low thicket. The numerous large scarlet fruits were conspicuous and very beautiful as they stand at this time of the year against the dark dull green foliage. I knew I had never before seen such a shrub anywhere, but, from what I had just observed, I judged that I had found the rare *Lindera melissaefolia*. Farmers in this region are acquainted with the shrub by the local name of "Pondberry". They state that the scarlet drupes are used locally as ammunition for "pop guns", tubular contrivances constructed from twigs of Elderberry (*Sambucus canadensis*) in this region.

Upon returning to Chicago, a critical study of the Missouri collection was made in comparison with material borrowed from the Gray Herbarium, Missouri Botanical Garden, the New York Botanical Garden, and the United States National Herbarium. In all these large herbaria there exists a total of only nineteen sheets, comprising only ten different collections, mostly all made over one hundred years ago! To the curators of these herbaria, and to the Curator of the Herbarium of the University of North Carolina, I am greatly obliged for the courtesy in loaning their material for study. Actually, loans were requested from all the herbaria of the southern states, but no specimens of true *Lindera melissaefolia* were found in the material sent by the curators of those herbaria. The following specimens of *L. melissaefolia* have been examined.

NORTH CAROLINA: wet flat near White Oak, Bladen Co., July 2, 1939, *Lionel Melvin* (NY, UNC); Chapel Hill, *Prof. Mitchell*

(NY); "North Carolina", *Schweinitz* (NY); Chapel Hill, cultivated from plant collected at White Oak, 1947, *W. C. Coker* (UNC). SOUTH CAROLINA: Since Walter's *Flora Caroliniana* covers a radius of fifty miles from his plantation (on the banks of the Santee River), his plant described in his flora must have come from somewhere within this area. GEORGIA: margin of pond in sand-hills of Little Ocmulgee River, Montgomery Co., Sept. 10, 1903, *Roland M. Harper*, no. 1989 (F, G, MBG, NY, US). FLORIDA: "Florida", *Chapman* (NY); "West Florida", *Chapman* (NY); "Florida", herb. *Chas. Mohr* (US). ALABAMA: Wilcox Co., 1839, *Buckley* (US); Wilcox Co., 1840, *Buckley* (G, NY). LOUISIANA: "Louisiana", *Hale* (G). MISSOURI: large stand in wooded depression, T 22 N, R 4 E, sect. 35, 4 mi. south of Naylor, Ripley Co., October 19, 1948, *Steyermack*, no. 66947 (F, G); same locality as previously cited above, Ripley County, Missouri, March 29, 1949, *Steyermack* 67084 and 67089 (staminate plants), and 67090 (pistillate plants) (F).

Evidently, then, judging by preserved collections, this shrub is a very rare one. Apparently, only three collections (including that of the present author) have been made in a wild state during the present century. Harper notes (*Econ. Bot. of Alabama*, p. 184. 1928) for the occurrence of this species in Alabama, that it is "a perfectly distinct species, but rare and little known. Said by Dr. Mohr to have been collected by Buckley near Allenton, Wilcox County; but apparently not seen in Alabama by any botanist in the last 75 years". Small, in his *Shrubs of Florida*, p. 85, 1913, states "about ponds and swamps, W. Fla.", but none of the specimens collected by Chapman in Florida mention any specific locality, nor did Small personally know the plant. Donald C. Peattie in his *Flora of the Tryon Region of North and South Carolina* (*Journ. Elisha Mitchell Scientific Soc.* 44, no. 1, p. 210. 1928) states that "Ashe in private correspondence with the writer reports finding this shrub near Melrose. Though there is no specimen, the report is perfectly reasonable and indeed probable", while Gattinger in his "Flora of Tennessee" (p. 84. 1901) states "not so frequent like the former. Cumberland Plateau". Both of these reports probably refer to misidentified pubescent *Lindera Benzoin*, since no authentic material of *L. melissaefolia* has been found in the herbarium of the University of Tennessee, nor in the flora of the Tryon region. Deam excludes it from his "Shrubs of Indiana" (p. 327. 1924), with the

statement that "This shrub was reported by Ridgway for the Lower Wabash Valley with a question mark. Since it has not been reported by any one else, it is not included in this list." It has, as yet, not been discovered either in Kentucky or Mississippi, and the single collection labelled "Louisiana" by Hale is the only record of its presumed occurrence in that state. Among the woody flora of the Charleston, South Carolina, area recorded by Hunt (Hunt, K. W. The Charleston Woody Flora. Am. Midl. Nat. **37**: 720. 1947), *L. melissaefolia* is mentioned only parenthetically, for we are told in his introduction on p. 683 that "In addition to the species and varieties of the catalogue, the keys include such additional species . . . as might possibly yet be found here. These are distinguished from the collected species by the use of parentheses". Therefore, so far as records go, Walter's original diagnosis of the species from the Santee River area of South Carolina is the only definite area in that state from which the species has been known. A recent collection (1927) from a wooded bank of the Santee Canal in Berkeley County, South Carolina, *Wiegand & Manning*, no. 1250, belongs with the common *L. Benzoin*. This is in the vicinity of the type locality of *L. melissaefolia*.

The Missouri record of 1948 is the most western one known at present, and occurs about 400 miles by air northwest of the nearest known locality (Wilcox County, Alabama). It was at first supposed that the Missouri material might differ from the specimens of the southeastern states, but careful study of details has not revealed any marked differences. It should be noted, however, that the Missouri specimens were collected in October, when the fruits showed their greatest maturity with corresponding maximum size, both as regards the fruit and the fruiting pedicels. When seen at this stage, the fruits are larger and of an obovoid shape, and the pedicels much longer than corresponding mature stages of development in *L. Benzoin*. The summit of the fruiting pedicels in *L. melissaefolia* is also much thicker and wider than in *L. Benzoin* (see plate 1151). Good mature fruiting specimens are apparently not available in the older collections of *L. melissaefolia*. At this late time of year (October), moreover, the foliage is larger and the lower surface of the blade less pubescent than in material collected earlier in

the season. It is also possible, of course, that the pubescence is somewhat variable in its degree, not only at different seasons of the year, but also in different localities. Nuttall (*Genera of North American Plants* 1: 259. 1818) noted that the fruits of *Euosmus* (*Laurus*) *Diospyrus* (= *Lindera melissaefolia*) were "larger than those of *E.[uosmus] Benzoin*", but he apparently is the only one to have brought out this observation. It is certainly evident in living material of this species.

Another difference not noted by earlier botanists is the fact that in *L. melissaefolia* the lowest two pairs of lateral nerves of the leaf-blades diverge at a greater angle ($45-50^\circ$) from the midrib than do the successive ones above (only about 35°), thus making them at variance with the other lateral nerves (see plate 1151). In contrast, in *L. Benzoin* and var. *pubescens*, the lateral nerves are mostly all parallel to one another, diverging from the midrib at an approximately equal angle of $35-45^\circ$, thus presenting a more uniform appearance. Moreover, the much paler, almost glaucous, lower surface of the leaf-blades in *L. Benzoin* and var. *pubescens* is in marked contrast to the mostly concolorous blades of *L. melissaefolia*. As early as 1814 Pursh (*Fl. N. Am.* 1: 276) noted that in *Laurus Benzoin* the blades were "subtus albicantibus". Meissner (*ibid.*) also states that in this species the blades are "subtus subglauculentibus". The venation on the lower leaf surface in *L. melissaefolia* is pronounced and conspicuous, whereas in *L. Benzoin* it does not stand out as such. Of course, the size of the shrubs is quite in marked contrast, as is the shape, venation, and base of the leaf-blade, and position of the foliage.

With the differences of mature fruit and foliage well in mind, the study of the two species was pursued the following spring in order to learn what, if any, differences in flowers might occur. Accordingly, a special trip was made during the last week in March of 1949 to the Missouri locality where *L. melissaefolia* had been found the previous autumn in a fruiting condition. Mr. Henry Hamlett, a farmer and keen observer of plant-life in the region where the *L. melissaefolia* occurs, wrote me that the "Pondberry", as it is known in that locality, was flowering. On March 29, then, I was back in the haunts of this rare shrub, with the opportunity of obtaining good flowering specimens.

Although various manuals and local floras state that the flowers in *Lindera* are dioecious, this information has not been followed up by collectors. An examination of available herbarium material reveals an abundance of staminate flowering specimens of *L. Benzoin*, but practically no pistillate collections. And, of course, for *L. melissaefolia*, it has been already stated that very few collections at all exist in herbaria.

The swampy depressions, which are the habitats for the Missouri station of *L. melissaefolia*, were filled with nearly a foot of water at the time I revisited them in March. The hundreds of plants filling the depressions were studded with pale yellow clusters of flowers of this species. Some plants only 0.5 meter or less tall were flowering. To my surprise, however, most of them having conspicuous flowers, proved, upon close examination, to be staminate. With a careful search, pistillate specimens were also located, but were in the minority. They had much less conspicuous flower-clusters.

On the knolls and adjacent drier ground, isolated bushes of *L. Benzoin* occurred. Here again it was observed that the conspicuous clusters of yellow flowers were entirely staminate. Pistillate plants were located with difficulty, due to their apparent scarcity together with their more reduced inflorescences. Apparently, then, here was the reason that collectors had invariably obtained staminate material in such preponderant quantities in contrast to the paucity of pistillate material collected; the staminate plants, being showier and more frequent, have caught the attention of the collector, while the pistillate plants, on the other hand, with their less conspicuous flowers, have been passed by either as too puny or undesirable for specimens, or else have not been carefully examined in the field.

A good series of staminate and pistillate collections of both species was obtained. Several striking differences were observable in the field. One of the most interesting noted was that the old fruiting pedicels of the previous year persist in *L. melissaefolia* through the period of anthesis of the following year, whereas in *L. Benzoin* they fall off during the winter, so that when anthesis occurs the following spring, they are not in evidence, as they are in the case of *L. melissaefolia*. In the field it is also apparent that the staminate flowers are larger in *L. Benzoin* than

in *L. melissaefolia*, whereas the pistillate flowers in *L. melissaefolia* are much larger and more conspicuous than the insignificant ones of *L. Benzoin*. In both species, therefore, the staminate flowers are the showier ones, the pistillate the less conspicuous and apparently less often encountered. An additional difference was also observed in the habit of growth between the two species. In *L. Benzoin* the plant is much larger, with a bushy, much-branched habit, whereas in *L. melissaefolia* the branching is much less developed and the plants are smaller in stature.

A summary of all the differences now found between *L. melissaefolia* and *L. Benzoin* and its var. *pubescens* may be stated in key form as follows:

Large shrub, mostly 1.6–4.5 meters tall, foliage erect-ascending or spreading, fragrant when crushed, but without a sassafras-like odor; leaf-blade thickish, firmly membranaceous, acute or cuneate at base, obovate, 4–15 cm. long, 2–7 cm. wide, pale or subglaucous on lower surface, glabrous, or in var. *pubescens* more or less pubescent at least on midrib and (or) lateral nerves of lower surface; lower surface of blade without conspicuous venation; lateral nerves mostly all parallel, diverging from midrib at an angle of 35–45°; petiole and buds glabrous, or in var. *pubescens* pubescent, 5–20 mm. long; fruiting pedicel slender, 3–4 mm. long, not conspicuously enlarged at summit, only 1–1.5 mm. wide at summit; mature fruit (in dried state) elliptic-oblong, 8–10 mm. long, 5–7 mm. wide; seed suborbicular, 7 mm. long, 5.5–6 mm. wide; winter buds glabrous, or in var. *pubescens* somewhat villous; staminate calyx-segments relatively broader, 1.5–2 mm. wide; staminate pedicels glabrous; filaments 0.3 mm. wide, dilated at base, 1.5 mm. long; pistillate calyx-segments relatively shorter and narrower, 1.5 mm. long, 0.5–1 mm. wide; pistillate pedicels relatively shorter, 1–1.5 mm. long; fruiting pedicels deciduous, not persistent to the next flowering season

Lindera Benzoin and var. *pubescens*

Low shrub, 0.6–2 mm. meters tall; foliage drooping, when crushed with a sassafras-like odor; leaf-blade thin, membranaceous, oblong, obtuse or rounded at base, 5–16 cm. long, 2–6 cm. wide, concolorous, slightly to densely pubescent on lower surface; lower surface of blade with conspicuous pronounced venation; lowest two pairs of lateral nerves not parallel to ones above, conspicuously more ascending and diverging from midrib at 45–50° angle, in contrast to the other lateral nerves which diverge at an angle of approximately 35°; petiole and buds pubescent, 5–15 mm. long; fruiting pedicels stout, 9–12 mm.

long, conspicuously enlarged at summit, 2.5–3 mm. wide; mature fruit (in dried state) elliptic-obovoid, 10–11.5 mm. long, 7–8 mm. wide; seed suborbicular, 7 mm. long, 6.25 mm. wide; winter-buds villous; staminate calyx-segments 1–1.25 mm. wide; staminate pedicels pilosulous; filaments slender, narrower, 0.1 mm. wide, not dilated at base, 1.8–1.9 mm. long; pistillate calyx-segments 1.5–2 mm. long, 1–1.25 mm. wide; pistillate pedicels 2.5 mm. long; fruiting pedicels persistent from previous year and lasting to time of anthesis. *Lindera melissaefolia*.

Since *Lindera* has been conserved over *Benzoin*, it is, of course, necessary to use the names *Lindera Benzoin* (L.) Blume, and var. *pubescens* (Palmer & Steyermark) Rehder, and *Lindera melissaefolia* (Walt.) Blume, as brought out by Rehder and by Fernald (see Journ. Arn. Arb. **20**: 413. 1939, and Rh. **47**: 140–142. 1945).

CHICAGO NATURAL HISTORY MUSEUM

EPIPACTIS HELLEBORINE AGAIN

ETHEL E. UPHAM

It is a pleasant experience for the botanist, expert or amateur, in the herbarium or in the field, when his find proves to mark an extension of range for the species. Such an experience was mine last summer. Three of us were exploring the rocky, thinly wooded bank of a little brook in the town of Southbridge, Massachusetts, and I, outdistancing the others for the moment, came upon an unfamiliar orchid, which, however, was soon identified as the interesting *Epipactis Helleborine* (L.) Crantz.

About fifteen plants of the orchid were found in the vicinity, approximately half of which were young plants without flowers. The date was July 25, and many of the blossoms which we saw were past their prime. One specimen was taken for the herbarium of the New England Botanical Club, and another is preserved in alcohol at the Ames Orchid Herbarium. An interesting feature of the latter is a fragment of rock to which the roots of the plant cling tenaciously. The roots had grown so tightly into the crevices of the rock that the latter had to be shattered before the plant could be taken.

A month or so later, in the course of a field trip of the Connecticut Botanical Society in the eastern edge of the town of Coven-